PATENT SPECIFICATION 1 303 135

DRAWINGS ATTACHED

1 303 135

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(54) IMPROVEMENTS IN OR RELATING TO ARRANGEMENTS FOR FORMING COMPRESSED STACKS OF A PREDETERMINED NUMBER OF FOLDED SHEETS

(71) We, VEB POLYGRAPH LEIPZIG KOMBINAT FÜR POLYGRAPHISCHE MASCHINEN und AUSRÜSTUNGEN, of 59 Zweinaundorfer, Leipzig, German Democratic Republic, a Corporation organised under the laws of the German Democratic Republic, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an arrangement for forming a compressed stack of a predetermined number of folded sheets preparatory to tying said stack into a bundle, comprising a longitudinally extending folded sheet stacking device and a press in which said stack is longitudinally compressed before being manually tied into a bundle. The term "longitudinally extending folded sheet stacking device" as used herein is intended to denote a device in which the folded sheets are formed into a stack in which the sheets are supported on edge.

Arrangements for forming stacks of folded sheets, for example on sheet collating machines or on folding machines, are known which comprise a folded sheet stacking device and a following stack press. The sheet stacking device in this case generally includes a partition or abutment member which is insertable between the individual stacks of folded sheets to be formed. At the end of the sheet stacking device there is then located a further abutment member which is pivotable away from the stack. The operations necessary for the function of these arrangements have to be performed manually. Thus, for example it is necessary to pivot the end abutment member manually away from the stack, to withdraw the partition member and insert the stack of a predetermined number of folded sheets into the press, to pivot back the end abutment member at the next stack of folded sheets to be formed, and to return the previously withdrawn partition member into its starting position within the stack. However, all these manual operations occupy one operative, make the operation of such a plant more difficult and limit its capacity. Difficulties are also encountered in adjusting the length of individual stacks in dependance on the weight of the sheets to be processed. Such a variation in said length is necessary in order to be able to maintain the bundle weight within the limits of the weight admissible for transport, when processing both small and large sheets.

It is furthermore impossible in the case of such an arrangement to prepare the stack press for tying the stack of sheets during the actual stacking of the sheets, that is, to insert bundle supporting boards and tying straps necessary for forming the bundle. This is dictated by the fact that the space between the sheet stacking device and the stack press must be clear in order to be able to slide the individual stack of sheets into the stack press. Thus these operations can only be effected after the individual stack of sheets has been inserted. This necessitates a high intensity of operatives.

Furthermore, such known arrangements have an undue length which is particularly due to the fact that the stacking device and the stack press are arranged one behind the other in series. In the case of another known arrangement, a preliminary stacking of the folded sheets into individual stacks is also necesary, which further increases the length of the arrangement.

It is an object of the invention to simplify the mode of operation of stack forming arrangements for folded sheets, to increase their capacity and to economise space in the workshops.

The underlying aim of the invention is to modify the stack forming arrangement having a sheet stacking device and a stack press

in such a way that only a few manual movements are necessary to operate it, that it is possible to prepare the stack press for tying the stack during the stacking of the sheets, and that only a comparatively small amount of space is required, more particularly in the direction of the length of the arrangement.

Accordingly, the present invention consists in an arrangement for forming a compressed stack of a predetermined number of folded sheets preparatory to tying said stack into a bundle, comprising a longitudinally extending folded sheet stacking device (as herein defined) and a press for longitudinal compressing said stack before typing it manually into a bundle, said pressing being arranged in parallel juxtaposed relationship to said stacking device, the latter including a driven slide movable transversely to the longitudinal direction of the stack and serving to transfer said stack sideways from said stacking device to said press.

Conveniently, the stacking device is provided at one end with a first yielding abutment for one end of the stack and includes a further abutment which is movable longitudinallly of the stack and insertable between individual stacks to be formed.

Advantageously, said further abutment is adapted to co-operate with a friction drive means which serves to impart to said further abutment a momentary movement toward said first yielding abutment.

Preferably, said first yielding abutment and said further abutment are adapted to cooperate with actuating means serving momentarily to move the two abutments away from each other in order to release the stack to enable the latter to be transferred from the stacking device to said press.

A virtually fully automatic mode of operation of stack formation is achieved by the invention. Also, no preliminary stacking of the folded sheets is necessary. Due to this and due to the parallel juxtaposed arrangement of the stack press relative to the stacking device, a short overall length is possible. A further facilitation of working consists in that preparation of the individual stack for tying into a bundle is possible during the actual stacking of the sheets, and that the entire arrangement can very easily be adjusted to the final length of the bundle which is a function of the bundle weight.

In order that the invention may be more readily understood, reference is made to the accompanying drawings which illustrate diagrammatically and by way of example, several embodiments thereof, and in which:—

Figures 1 to 6 show individual work phases of a stack forming arrangement in side elevation;

Figure 7 shows the arrangement in side elevation;

Figure 8 is an end elevation of Figure 7;

Figure 9 is a plan view of Figure 7;

Figure 10 shows the stacking of folded sheets with a movable abutment member for the stack in longitudinal alignment with the stack but in its inoperative position;

Figure 11 is a view similar to that of Figure 10 with the abutment member in its operative position;

Figure 12 shows an end view of a sheet stacking device with a stack press pivotable to both sides; and

Figure 13 shows the pivoted position of the stack press according to Figure 12.

Referring to the drawings, the folded sheets are fed by a transport device 1 having a counter 2 to a stacking device 3. Initially (Fig. 1), a movable abutment member for the stack in the form of a rake 4 holds the stack at its leading end until the latter has reached a resiliently yielding end abutment 6, the bearing 7 of which is adjustable according to the stack length of the required number of folded sheets. In this operation the rake 4 is moved towards the end abutment 6 by the thrust of the steadily increasing stack 13 of folded sheets. Upon reaching the end abutment 6 the rake 4 is withdrawn from the stack 13 in the downward direction (Fig. 2) and transported back into its starting position outside the stack 13 by transport means 8 (Fig. 7), in the present embodiment by spring traction. The lowering of the rake 4 is effected by pneumatic or hydraulic transport element 9 on a slideway 10. Meanwhile the stack 13 grows up to the required number of sheets (Fig. 3). After a determined number of sheets has been counted the rake 4 is inserted behind the last sheet of stack 139 from below (Fig. 4). In order to facilitate this insertion, a controlled deflector 5 (Fig. 7) is brought into the feeding zone of the stacking device 3 and by means of its wedge-like projection 5' catches the sheets of a fresh stack being formed and holds them back until the introduction of the rake 4 is completed, whereupon the deflector 5 is retracted and releases the sheets of the fresh stack 13' being formed which are then held by the rake 4 (Fig. 4).

As the fresh stack 13' of folded sheets grows the displacement of the stack 13 towards the righthand side (as viewed in Fig. 4) is absorbed by the yielding end abutment 6. The rake 4 has on its underside a friction inducing surface 11 which upon coming into contact with a continuously rotating roller 12 causes the rake 4 to be moved momentarily a short distance towards the end abutment 6 into the position illustrated in Fig. 5 independently of the

thrust of the freshly formed stack 13'.

The stack 13 now has an exactly determined length since the yielding abutment 6 abuts a stop means 23. This is possible on account of the elasticity of the stack 13. There next follows a releasing of stack 13 by moving the rake 4 and the abutment 6 a short distance away from each other. This is effected by actuating elements, for example solenoids 24 and 25 (Fig. 7) the armatures 24' and 25' of which carry pawls 24" and 25" which are adapted respectively to engage a bar 11' of the rake 4 and a flange 6' of a guide rod 6" of the abutment 6.

Upon release of the stack 13 by the rake 4 and the abutment 6, the stack 13 is now pushed transversely by means of a hydraulically or pneumatically actuated slide 14 (Figs. 7 to 9) out of the stacking device 3 into a press 15 in which the stack of folded sheets is compressed before being manually tied into a bundle. The press 15 is arranged in parallel juxtaposed relationship to the stacking device 3 and has an end abutment 16 for the stack the position of which is adjustable as required in dependence on the length of stack introduced into the press 15. The press 15 is arranged for pivoting on bearings 17 (Fig. 8). The pivoting may be effected manually or by a piston and cylinder device 18. In the pivoted position (shown by chain-dotted lines in Fig. 8) the stack 13 is pressed and tied for which purpose pneumatic or hydraulic means 19 are provided (Fig. 9).

Electrical switch contacts serve to render the work cycle automatic. Thus, the signal transmission for the actuation of the deflector 5 and the raising of the rake 4 is effected by the counter 2 (Fig. 7). The switching on of the movement of the slide 14, the pivoting of the press 15 and the switching on of the pressing operation is effected by a switch 20 (Fig. 7). The lowering of the rake 4 is initiated by a switch 21 (Fig. 7). Switches 22 serve to interlock the movement of the slide 14 (Figs. 8 and 9).

Figs. 10 and 11 show a further advantageous possibility of inserting the rake 4 into its operative position. The rake 4 in this case is inserted for alignment with the stack from beneath at a place upstream of the folded sheet transport device 1, that is to the lefthand side (as viewed in Fig. 10) of the sheet stack 13 to be formed. The rake 4 therefore does not touch any folded sheets whatsoever at this time. As soon as the last folded sheet 28 belonging to the stack (Fig. 11) has been fed, the rake 4 is moved to the right by a solenoid 26 and applied against the stack 13. A back stop 27 (Fig. 10) prevents the rake 4 from sliding back at the return stroke of the solenoid 26. The next folded sheet 29 entering (Fig. 11) thus arrives on the lefthand side of the rake 4 and forms the first folded sheet of a fresh stack 13' (as in Fig. 4). By virtue of this favourable movement cycle of the rake 4 it is achieved that the rake 4 cannot push any folded sheets upwards out of the stacks 13, 13'.

Figs. 12 and 13 show a further possibility for pivoting the stack press 15 into, for example a V-shaped channel position. The tilting movement in this case can occur towards the lefthand side and also towards the righthand side. It is thereby possible to align the stack 13 in the press 15, the aligning edge of which is located on the lefthand or also on the righthand side of the stack. The sheet stacking device and/or the stack press 15 may be acted on by a vibrator (not shown), for squaring up the folded sheets in the stacking device and/or the press.

WHAT WE CLAIM IS:—

1. An arrangement for forming a compressed stack of a predetermined number of folded sheets preparatory to tying said stack into a bundle, comprising a longitudinal extending folded sheet stacking device (as herein defined) and a press for longitudinally compressing said stack before tying it manually into a bundle, said press being arranged in parallel juxtaposed relationship to said stacking device, the latter including a driven slide movable transversely to the longitudinal direction of the stack and serving to transfer said stack sideways from said stacking device to said press.

2. An arrangement as claimed in claim 1, wherein the stacking device is provided at one end with a first yielding abutment for one end of the stack and includes a further abutment which is movable longitudinally of the stack and insertable between individual stacks to be formed.

3. An arrangement as claimed in claim 2, wherein said further abutment is adapted to co-operate with a friction drive means which serves to impart to said further abutment a momentary movement towards said first yielding abutment.

4. An arrangement as claimed in claim 2 or 3, wherein said first yielding abutment and said further abutment are adapted to co-operate with actuating means serving momentarily to move the two abutments away from each other in order to release the stack to enable the latter to be transferred from the stacking device to said press.

5. An arrangement as claimed in any one of the preceding claims, wherein the press is mounted so as to be pivotable towards and away from the stacking device about an axis parallel to the stack.

6. An arrangement as claimed in any one of the preceding claims, wherein the stacking device and/or the press comprises a vibrator for facilitating the squaring up of the folded sheets in the stacking device and/or the press.

7. An arrangement for forming a stack of a predetermined number of folded sheets, substantially as herein described with reference to the accompanying drawings.

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FIG.10

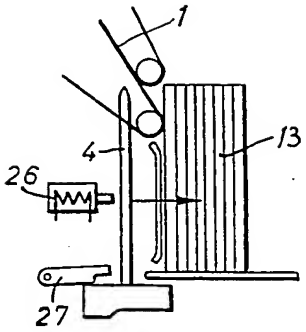


FIG.11

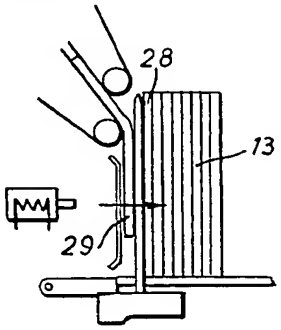


FIG.12

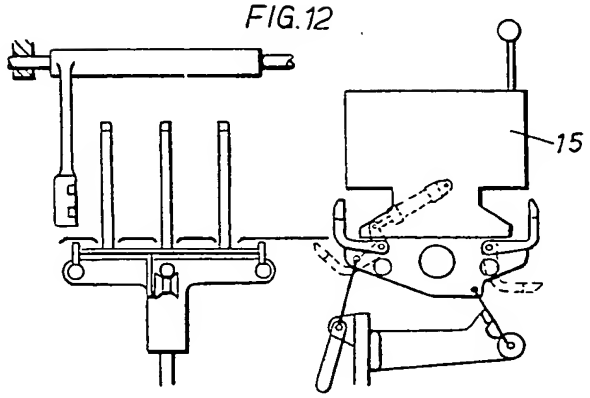
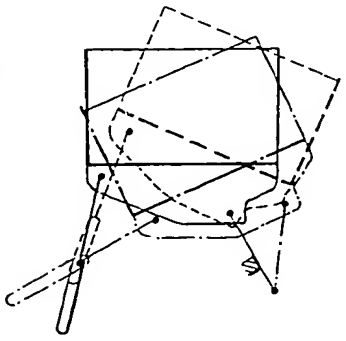


FIG.13



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1303135 COMPLETE SPECIFICATION
3 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheet 2

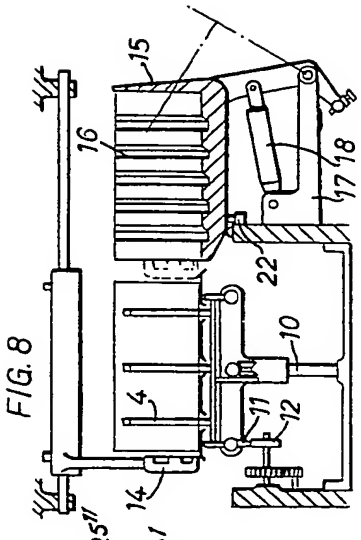

FIG. 8

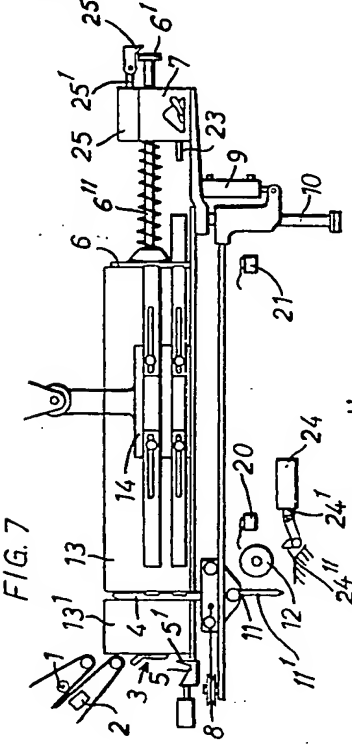

FIG. 7

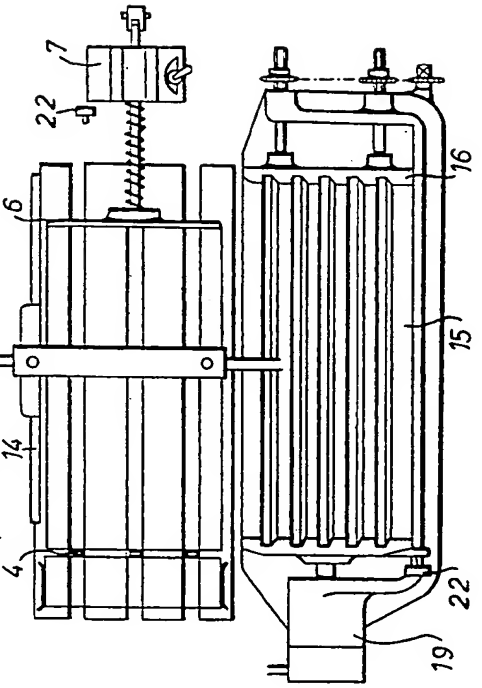

FIG. 9

1303139 COMPLETE SPECIFICATION
3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

FIG.1

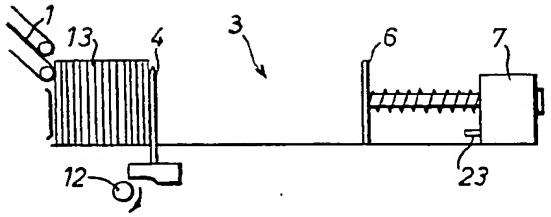

FIG.2

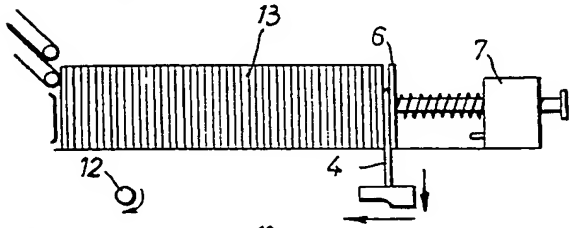

FIG.3

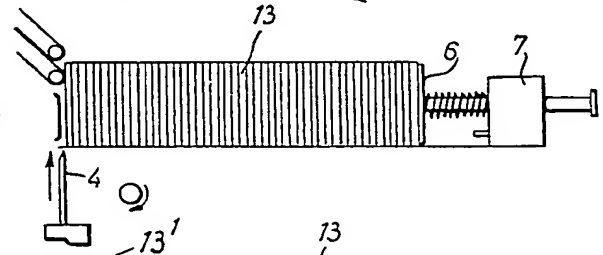

FIG.4

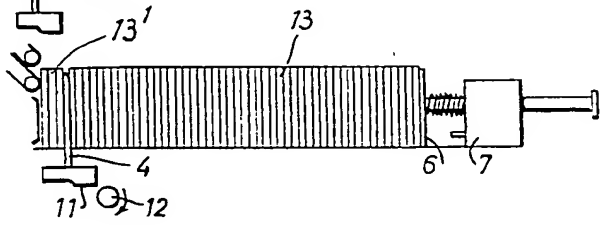

FIG.5

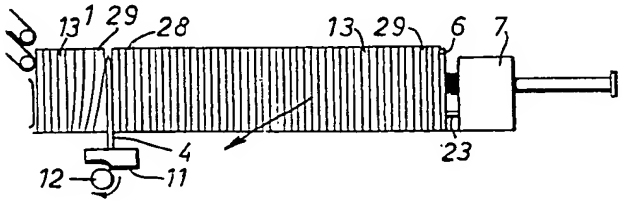

FIG.6